Journal of Racial and Ethnic Health Disparities
https://doi.org/10.1007/s40615-022-01311-9

COVID-19 Mental Health Impacts Among Parents of Color and Parents of Children with Asthma

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Received: 16 November 2021 / Revised: 18 April 2022 / Accepted: 21 April 2022

Abstract

Objectives This study investigated whether select social determinants of health and worries about COVID-19 resource losses mediated the relations between four parent groups: [1) non-Hispanic White (NHW) parents of children with asthma; 2) Black, Indigenous, or other Persons of Color (BIPOC) parents of healthy children; 3) BIPOC parents of children with asthma; and 4) NHW parents of healthy children (referent)] and parent anxiety and depression symptoms during COVID-19.

Methods Parents ($N = 321$) completed online questionnaires about discrimination, anxiety, depression, and COVID-19 impacts on employment/income and access to food and health care. Mediation analyses were conducting using nonparametric bootstrapping procedures.

Results BIPOC parents of children with and without asthma experienced greater anxiety and depression symptoms through greater discrimination compared to NHW parents of healthy children. BIPOC parents of children with asthma experienced greater anxiety symptoms, and both BIPOC groups experienced greater depression symptoms, through greater COVID-19 income losses. NHW parents of children with asthma and both BIPOC groups experienced greater anxiety and depression symptoms through greater worries about COVID-19 resource losses.

Conclusions The suffering of BIPOC parents, especially BIPOC parents of children with asthma, necessitates multi-level COVID-19 responses to address key drivers of health inequities.

Keywords Social Determinants of Health · Discrimination · COVID-19 · Asthma · Black, Indigenous, and Other People of Color (BIPOC)

Introduction

The novel 2019 coronavirus (COVID-19) pandemic has resulted in significant health and economic losses in the USA, particularly among Black, Indigenous, and other People of Color (BIPOC)[1, 2][1] populations. BIPOC individuals have continued to disproportionately experience high risks for contracting COVID-19, poorer COVID-19 health outcomes, and greater financial losses (e.g., income, employment, and food insecurity) during the pandemic [3–5]. Asian, Asian-American, and Pacific Islander populations have experienced increased racism, discrimination (e.g., hate crimes), and mental health problems since the onset of the COVID-19 pandemic, which has been fueled by misinformation about COVID-19 origins and the transmission of the virus, and this misinformation has been perpetuated by the media and the former US administration [6, 7]. Relative to non-Hispanic White (NHW) populations, factors that increase COVID-19 risks among BIPOC populations include: higher rates of discrimination; higher rates of existing chronic health conditions; lower healthcare access and utilization; lower education, income, and wealth; crowded housing conditions (e.g.,

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[1] To supplement the commonly used People of Color (POC) abbreviation, we use Black, Indigenous, and other People of Color (BIPOC) throughout as an inclusive term that centers Black and Indigenous peoples who have often been erased or underrepresented in past literature (e.g., Frisby 2020; Watson-Singleton et al., 2021); we also acknowledge limitations of using this abbreviation in the discussion.

Published online: 03 May 2022

multi-generational households), and overrepresentation as essential workers interacting with the public (e.g., health care, farm, factory, grocery store, and public transportation employees) [4, 8–14]. Many of these contributors to COVID-19 risk are considered social determinants of health (SDOH). SDOH are the contexts that families live, work, learn, and play in [15]; these contexts are shaped by interlocking systems of power and oppression and influence the distribution of resources [15, 16]. Pre-pandemic social inequities that drive health disparities are widening during COVID-19, thereby magnifying BIPOC individuals' risk for poorer health outcomes during the pandemic and thereafter [11].

The same SDOH contributing to racial disparities in COVID-19 also influence health conditions that are related to increased risk for COVID-19. For example, asthma is the most common chronic medical condition among children, and approximately 7% of children in the USA have asthma [17]. It is well documented that SDOH are critical factors in asthma [18–20], with higher rates of asthma among Black, Puerto Rican, and American Indian/Alaskan Native children [21]. Given that COVID-19 is an acute infectious disease that can trigger acute respiratory distress [22] and because asthma is a chronic respiratory pathology that can be aggravated [17], research has suggested that individuals with asthma have a higher risk of developing respiratory complications and more severe symptoms if they contract COVID-19 [23, 24]. Factors associated with having asthma, including SDOH, have posed increased risks for those with asthma during the COVID-19 pandemic, such as medical care disruptions, increased exposure to home-based triggers, and increased anxiety/distress, which may lead to deteriorations in asthma control for some [25, 26]. Importantly, parents of children with lung disease are experiencing greater anxiety relative to parents of healthy children during the pandemic [27–29] and are specifically experiencing more COVID-19-specific worry. To date, there is scant literature on the intersection of respiratory disease (i.e., asthma) and respiratory virus (i.e., COVID-19) and on how the COVID-19 pandemic is affecting parents with the intersecting identities of being racially marginalized and being a parent of a child with lung disease.

The National Institute of Minority Health and Health Disparities (NIMHD) Research Framework integrates social ecological theory, life course theory, and an existing National Institute of Aging model to identify factors that are dynamically related and work synergistically to influence health disparities across the lifespan among minoritized populations, including BIPOC populations (Black/African-American, Hispanic/Latino, Asian, American Indian/Alaska Native, and Native Hawaiian/other Pacific Islander populations) [30]. The current study drew upon the NIMHD Health Disparities Research Framework to identify how perceived changes to SDOH and parental COVID-19 worry are affecting mental health disparities during the COVID-19 pandemic among four parent groups: NHW parents of children with asthma, NHW parents of healthy children, and BIPOC parents of children with and without asthma. Parent groups were classified in this way due to prior literature on how intersectionality impacts health inequities [16, 20] and Minority Stress Theory [31], both of which posit that members of cultural minoritized groups are exposed to frequent and damaging stressors and SDOH, such as prejudice, discrimination, and racism. Asthma status constitutes a marginalized identity based on its health chronicity and association with deleterious SDOH (e.g., poor housing/neighborhood conditions, poverty, secondhand smoke exposure, and healthcare access difficulties [18–20, 32], and because it is more prevalent among Black, Puerto Rican, and Indigenous populations [21]. Parents of children with asthma share sociocultural experiences (including exposure to deleterious SDOH) with their children with asthma and may also experience affiliative stigma associated with their child's illness, both of which may negatively impact parent mental health [33–35]. Furthermore, research has demonstrated that members of multiple minoritized groups experience additional psychological distress due to the compounded effects of multiple minoritized identities that go above and beyond the effects of each minority identity considered singly (e.g., [36–38]. Thus, the previous theoretical and empirical research informed the four-parent group classification in the current study.

One prior, related paper has examined SDOH and perceived changes in SDOH during COVID-19 among parents of children with asthma and BIPOC parents of children with and without asthma relative to NHW parents of healthy children. Overall, BIPOC parents of children with asthma experienced the most pervasive negative COVID-19 impacts on family resource losses and parent psychosocial responses to COVID-19 relative to parents with fewer minoritized identities [29]. More specifically, BIPOC parents experienced greater discrimination and greater *pandemic-related* resource losses (i.e., employment loss, income loss, and food insecurity) compared to NHW parents of healthy children. Furthermore, BIPOC parents of children with and without asthma and NHW parents of children with asthma reported greater healthcare disruptions and resource loss worries during COVID-19 relative to NHW parents of healthy children. Taken together with prior research that has demonstrated increased parental anxiety among families of children with chronic lung diseases [27, 39, 40] and greater resource losses among BIPOC individuals during the pandemic [5], these results highlight the need for additional research investigating pandemic-related impacts on BIPOC parents and parents of children with asthma, and those with intersecting identities. Importantly, it remains unclear how the

disproportionate deterioration of SDOH and associated pandemic-related worries impact parental anxiety and depression symptoms among BIPOC parents and NHW parents of children with asthma during COVID-19. Research identifying mechanisms that may either strengthen or mitigate the relations between changes in SDOH and parental anxiety and depression symptoms among BIPOC and NHW parents of children with asthma is warranted.

This study aims to examine whether select SDOH and worries about SDOH during COVID-19 contribute to poorer caregiver mental health for families of color and of children with asthma, as they are more likely to experience detrimental SDOH. The first aim was to elucidate whether SDOH and changes in SDOH during the pandemic (e.g., discrimination, income, food access, mental and medical care access losses) mediated the relation between four parent groups (NHW parents of children with asthma, BIPOC parents of healthy children, BIPOC parents of children with asthma, and NHW parents of healthy children) and parental anxiety and depression symptoms during COVID-19. It was hypothesized that BIPOC parents would experience greater discrimination, and in turn, greater anxiety and depression symptoms. It was also hypothesized that NHW parents of children with asthma and BIPOC parents of children with and without asthma would experience greater changes in SDOH, and in turn, greater anxiety and depression symptoms. The second aim was to identify whether worries about resource losses during COVID-19 (e.g., income loss and food insecurity) mediated the relation between parent groups and overall parental anxiety and depression symptoms. It was hypothesized that NHW parents of children with asthma and BIPOC parents of children with and without asthma would experience greater anxiety and depression symptoms through greater worries about COVID-19 resource losses.

Method

Participants and Procedures

This study recruited four groups of parents ($N=321$) from June to August 2020 using Prolific (www.prolific.co), a crowdsourcing participant panel [41]. Prolific provides a range of demographic information about the participant pool on its website, which can be used to screen participants [41]. Prior research has indicated that crowdsourcing methods produce comparable results to traditional in-person methodologies [42], and research has suggested that Prolific produces data with higher reliability and validity compared to alternative platforms [41]. Informed consent was obtained prior to screener/survey completion. A screener identified eligible parents for this study (i.e., aged ≥18 years and a legal guardian who lived with a 5–17-year-old child) through Prolific. Eligible parents were classified into one of four parent groups: 1) NHW parents of children with asthma ($n=62$, 18.7%), 2) BIPOC parents of healthy children ($n=100$, 30.2%%), 3) BIPOC parents of children with asthma ($n=91$, 27.5%), and 4) NHW parents of healthy children ($n=68$, 20.5%; referent group). Parents were included in one of the BIPOC groups if they self-identified as being Black, American Indian/Alaskan Native, Latinx, Asian, from an "Other group," or from multiple racial/ethnic backgrounds. Parents who lived with a child with asthma were eligible for one of two asthma parent groups. Parents eligible for the healthy parent group had a child aged 5 to 17 years old without any diagnosed medical conditions. After participants were categorized into four parent groups, they were randomly selected to participate in the full survey. Participants were reimbursed for screener/survey completion (i.e., $6.50/hour).

The initial sample included 329 participants. Responses were screened for inconsistent responding, nonsensical free-text answers, and incorrect responses on attention check items [43]; potentially problematic cases were examined by four independent evaluators. Participants who missed ≥50% of attention checks were removed ($n=7$); this threshold was used to maximize data accuracy while retaining a representative sample (e.g., retaining parents with potentially lower literacy; [43]). One participant was deleted due to inconsistent responding, resulting in a sample of 321. Sample sizes varied across analyses due to missing data; the smallest sample included 271 parents.

Measures

Demographics Parents reported on parent ethnicity/race, age, gender, education, and medical conditions; income; number of children; health insurance status; and child age and gender. Parents reported on if their child had ever been diagnosed with asthma by a healthcare provider. Prior research has demonstrated the validity of parent proxy reports of child asthma [44]. Each of these demographic variables was assessed as potential covariates.

Parental Anxiety and Depression Symptoms Parents completed the Patient-Reported Outcomes Measurement Information System 29-Item profile measure (PROMIS-29 Profile v2.1) [45], which assesses 7 health-related quality of life domains (i.e., anxiety, depression, physical function, fatigue, sleep disturbance, pain interference, and ability to participate in social roles and activities) with four questions each and responses ranging from 1 to 5; only anxiety and depression symptoms were examined in the current study and served as the dependent variables. This measure assesses current symptoms experienced in the past 7 days that are universal, rather than disease-specific. Raw scores were converted to

T-scores, wherein scores have a mean of 50 and a standard deviation of 10 for the general population in the USA, drawn from the US Census [45]. This measure has previously demonstrated excellent psychometric properties in other samples [46], including among ethnically and racially diverse samples [47, 48]. It demonstrated excellent reliability for anxiety and depression symptoms in the current sample (Cronbach's $\alpha = 0.91$ and 0.92, respectively). For depression, internal consistency ranged from 0.90 to 0.94 across the four parent groups. For anxiety, internal consistency ranged from 0.88 to 0.93 across the four parent groups.

Discrimination Parents completed the Everyday Discrimination Scale [49], which assesses the frequency of experiencing discrimination in the past year; this was examined as a mediator. Consistent with prior research, a frequency total score was competed, reflecting the frequency of experiencing discrimination; however, the frequency total score does not delineate attributions for discrimination (e.g., because of one's race, age, religion, physical appearance, sexual orientation, socioeconomic level, disability) [49, 50]. Previous research has defined discrimination as a chronic stressor regardless of the source of discrimination (e.g., race/ethnicity, age, and gender), and research indicates that those who experience greater discrimination in daily life tend to have poorer physical and mental health outcomes compared to their counterparts [51]. This measure has previously demonstrated overall invariance in measuring discrimination across non-Hispanic White, Black, Hispanic/Latino, and Asian adults [51]. This measure demonstrated excellent psychometric properties in prior studies [49, 50] and in the current sample (Cronbach's $\alpha = 0.92$). Internal consistency ranged from 0.85 to 0.94 across the four parent groups.

COVID-19 Experiences and Impacts Parents completed modules from the Johns Hopkins University COVID-19 Community Response Survey [52]. Parents reported on several COVID-19 outcomes (parent history of COVID-19; parent COVID-19 job risk; number of family members diagnosed, hospitalized, quarantined, or died due to COVID-19) that were examined as potential covariates. Parents also reported on several COVID-19 impacts, including how COVID-19 had impacted family access to food (response options ranged from *0 = No* to *3 = Severely/Frequently*) and access to medical and mental health care (response options ranged from *0 = None* to *4 = Severely*), and these factors were examined as potential mediators. Parents also completed the Resource Loss Worry subscale [29]; this subscale assessed parental worries about finances/food insecurity during COVID-19 and was examined as a mediator. This subscale demonstrated good reliability in the current sample (Cronbach's $\alpha = 0.87$). Internal consistency ranged from 0.83 to 0.91 across the four parent groups.

Parents also completed the COVID-19 Adolescent Symptom and Psychological Experience Questionnaire-Parent (CASPE-P) [53]. The current study examined child COVID-19 experiences (e.g., child tested, diagnosed, or quarantined for COVID-19) as potential covariates, and changes in family resources due to COVID-19 as a mediator. This was assessed by asking parents what resource losses/changes they had experienced due to COVID-19 (i.e., job loss by caregivers, difficulty paying bills or buying necessities (e.g., food), adults working longer hours, filing for unemployment, and applying for government assistance (e.g., food stamps). A total score was created by summing the number of endorsed losses; higher scores indicated greater income/resource losses.

Statistical Analyses

First, analyses examined differences in demographic variables (Table 1) and family COVID-19 experiences (Supplement 1) across the four parent groups ($\alpha = 0.1$) in order to identify potential covariates for the main analyses. Parent age, education, and asthma status differed by groups and thus were included as covariates. In addition, parent gender and COVID-19 history, and child COVID-19 testing history were included as covariates given their prior associations with mental health [29].

To examine the first aim of whether SDOH, and changes in SDOH during the pandemic, mediated the relation between four parent groups and parental anxiety and depression symptoms, four separate mediation analyses were conducted using heteroskedasticity-consistent standard error estimators, 5,000 bootstrapped resamples, and 95% confidence intervals [54]. A mediating effect was identified if at least one of the relative indirect effects was significant (NHW parents of healthy children was the referent group, resulting in three dummy coded variables that represented the other three parent groups for comparison). Partially standardized relative indirect effects were reported. The PROCESS macro in SPSS was used [54]. A multiple mediation model was conducted to examine whether SDOH (discrimination; changes in medical and mental health care, income, and food access during COVID-19) mediated the relation between parent group and anxiety symptoms (Parent Group → COVID-19 SDOH Changes → Anxiety); a separate model was conducted with depression symptoms as the outcome.

To examine the second aim of whether worries about resource losses during COVID-19 mediated the relation between four parent groups and parental anxiety and depression symptoms, two separate models investigated worry about resource losses during COVID-19 as a mediator

Table 1 *Descriptive Statistics*

	Total ($N=321$)	Parent Groups				
		Non-Hispanic, White Parents of Healthy Children ($n=68$)	Non-Hispanic, White Parents of Children with Asthma ($n=62$)	BIPOC Parents of Healthy Children ($n=100$)	BIPOC Parents of Children with Asthma ($n=91$)	
	Mean (SD) / n (%)	Mean (SD)/n (%)	Mean (SD)/n (%)	Mean (SD)/n (%)	Mean (SD)/n (%)	F/ x^2
Sample Demographics						
Parent						
Age	36.48 (9.13)	39.45 (9.77)	36.62 (7.99)	36.27 (9.78)	34.49 (8.08)	F = 3.50, p = .02
Female Gender	161 (50.2%)	36 (52.9%)	31 (50.0%)	50 (50.0%)	44 (48.4%)	×2 = .80, p = .85
Race/Ethnicity (Checked all that Applied)[a]						
Non-Hispanic, White	-	68 (100.0%)	62 (100.0%)	8 (8.0%)	5 (5.5%)	-
Black	100 (31.2%)	0	0	53 (53.0%)	47 (51.6%)	-
Latinx	37 (11.5%)	0	0	21 (21.0%)	16 (17.6%)	-
Asian	37 (11.5%)	0	0	16 (16.0%)	21 (23.1%)	-
American Indian/ Alaskan Native	12 (3.7%)	0	0	8 (8.0%)	4 (4.4%)	-
Multiple Racial Backgrounds	17 (5.3%)	0	0	6 (6.0%)	11 (12.1%)	-
Other	1 (.3%)	0	0	0	1 (1.1%)	-
≥Bachelors Degree	181 (56.4%)	35 (51.5%)	32 (51.6%)	54 (54.0%)	60 (65.9%)	×2 = 7.16, p = .07
Has Health Insurance	253 (78.8%)	51 (75.0%)	47 (75.8%)	83 (83.0%)	72 (79.1%)	×2 = .80, p = .85
Household Income in 2019	$83, 752.22 (62,216.46)	$94,436.71 (87,744.91)	$79,176.14 (59,299.88)	$74,302.02 (47,619.81)	$88,532.96 (54,379.01)	F = 1.23, p = .30
Parent Asthma	26 (8.1%)	3 (4.4%)	9 (14.5%)	5 (5.0%)	9 (9.9%)	×2 = 6.35, p = .096
# of People Living in House	3.87 (1.15)	3.91 (1.03)	3.83 (1.02)	3.85 (1.27)	3.87 (1.21)	F = ..06, p = .98
# of Children	1.97 (.90)	2.03 (1.03)	2.00 (1.00)	1.91 (.93)	1.96 (.69)	F = .24, p = .87
Child						
Age	8.32 (11.27)	10.12 (4.02)	10.00 (3.73)	6.74 (16.05)	7.52 (11.99)	F = 1.81, p = .15
Female Gender	148 (46.1%)	32 (47.1%)	26 (41.9%)	49 (49.0%)	41 (45.1%)	$x^2 = .81$, p = .85
Has Health Insurance	259 (80.7%)	53 (77.7%)	48 (77.4%)	85 (85.5%)	73 (80.2%)	$x^2 = .39$, p = .94
Mediators						
Perceived discrimination	8.27 (9.49)	5.20 (6.20)	6.92 (10.44)	8.37 (8.42)	11.00 (11.09)	F = 4.80, p = .003
Pandemic-related changes to income	.78 (1.10)	.62 (1.01)	.71 (.93)	.69 (.98)	.97 (1.24)	F = 1.76, p = .15
Pandemic-related changes to food access	.66 (.77)	.53 (.72)	.64 (.77)	.62 (.73)	.72 (.76)	F = .76, p = .52
Pandemic-related changes to medical care	1.10 (1.11)	.84 (1.10)	1.36 (1.18)	.86 (.99)	1.28 (1.06)	F = 4.52, p = .004
Pandemic-related changes to mental health care	.66 (.99)	.45 (.88)	.77 (1.10)	.57 (.92)	.70 (.92)	F = 1.39, p = .25

Table 1 (Continued)

	Total ($N=321$)	Parent Groups				
		Non-Hispanic, White Parents of Healthy Children ($n=68$)	Non-Hispanic, White Parents of Children with Asthma ($n=62$)	BIPOC Parents of Healthy Children ($n=100$)	BIPOC Parents of Children with Asthma ($n=91$)	
	Mean (SD) / n (%)	Mean (SD)/n (%)	Mean (SD)/n (%)	Mean (SD)/n (%)	Mean (SD)/n (%)	F/ x^2
Worry about resource losses during COVID-19	13.36 (5.76)	11.02 (5.56)	14.13 (5.89)	13.53 (5.40)	14.00 (5.79)	$F=4.13$, $p=.007$
Dependent Variables						
Parent Anxiety Symptoms	53.54 (9.61)	53.10 (9.62)	53.78 (10.93)	51.44 (9.66)	55.30 (10.11)	$F=1.96$, $p=.12$
Parent Depressive Symptoms	50.01 (9.54)	49.99 (9.32)	51.03 (10.30)	47.34 (8.34)	51.80 (10.03)	$F=3.73$, $p=.01$

Due to missing data, some percentages may not add up to 100%. These analyses examined study group differences in demographic variables ($\alpha=.1$) in order to identify potential covariates for the main analyses, and examined group differences in the mediators and dependent variables to inform readers

Group differences in the following other parent medical conditions were examined but not significant: HIV, hepatitis B, hepatitis C, tuberculosis, hypertension, diabetes, kidney disease, cancer, cardiovascular disease, asthma, COPD, substance use disorder, and other conditions

[a] Participants checked all that applied, so n's might add up to more than group sizes. Participants who endorsed being White along with another race/ethnicity were coded placed in a BIPOC group

(Group→Worry about Resource Losses → Anxiety & Depression Symptoms); this mediator was not examined in the multiple mediator model because of its construct overlap with the dependent variables, given they are all mental health difficulties. Preliminary analyses were completed with all mediators simultaneously entered into the models to test our hypothesis. As predicted, resource loss worry emerged as a significant mediator for the anxiety and depressive symptom models, and all other mediation paths were nonsignificant. Thus, in order to elucidate whether perceived SDOH changes also served as potential mechanisms driving mental health inequities, separate models were conducted when examining perceived SDOH changes and resource loss worries as potential mediators.

Results

Study Group → COVID-19 SDOH and SDOH Changes → Anxiety and Depression Symptoms

Anxiety Symptoms A multiple mediation model simultaneously investigated the following potential mediators: discrimination and changes in SDOH (medical care, mental health care, income loss, and food access during COVID-19). Parental discrimination and COVID-19 income loss each significantly mediated the relation between parent group and parental anxiety during the pandemic (Fig. 1; Supplement 2). Based on the bootstrapped relative indirect effects, BIPOC parents of healthy children (0.07, 95% CI: 0.008, 0.18) and BIPOC parents of children with asthma (0.08, 95% CI: 0.008, 0.15) experienced greater anxiety symptoms through greater experiences of discrimination compared to NHW parents of healthy children. Income loss during the pandemic was also a significant mediator: BIPOC parents of children with asthma experienced greater anxiety through greater COVID-19 income losses (0.06, 95% CI: 0.001, 0.16) compared to NHW parents of healthy children. The relative indirect effects for income loss were nonsignificant for the other two groups (NHW parents of children with asthma: (0.02; 95% CI: -0.03, 0.10) and BIPOC parents of healthy children: (0.02, 95% CI: -0.02, 0.09)) when compared to NHW parents of healthy children. Changes in medical care, mental health care, and food access during COVID-19 were not significant mediators.

Depression Symptoms Parental discrimination and income loss during COVID-19 significantly mediated the relation between parent group and parental depression symptoms during the pandemic (Fig. 2; Supplement 3). Based on the bootstrapped relative indirect effects, BIPOC parents of healthy children (0.07, 95% CI: 0.01, 0.16) and BIPOC

parents of children with asthma (0.08, 95% CI: 0.01, 0.10) experienced greater depression symptoms through greater discrimination compared to NHW parents of healthy children. Income loss during the pandemic was also a significant mediator: BIPOC parents of children with asthma experienced greater depression symptoms through greater COVID-19 income losses (0.10, 95% CI: 0.01, 0.23) compared to NHW parents of healthy children. The relative indirect effects for income loss were nonsignificant for the other two groups (NHW parents of children with asthma: (0.03; 95% CI: -0.05, 0.13) and BIPOC parents of healthy children: (0.03, 95% CI: -0.04, 0.12)) when compared to NHW parents of healthy children. COVID-19 changes in medical care, mental health care, and food access were not significant mediators.

Study Group → Worry about Resource Losses → Anxiety and Depression Symptoms

Anxiety Symptoms Worries about resource losses during COVID-19 mediated the relation between parent group and parental overall anxiety during the pandemic (Supplement 4). NHW parents of children with asthma (0.30, 95% CI: 0.09, 0.52), BIPOC parents of healthy children (0.23, 95% CI: 0.05, 0.42), and BIPOC parents of children with asthma (0.23, 95% CI: 0.05, 0.44) experienced greater general anxiety symptoms relative to NHW parents of healthy children through greater worries about COVID-19 resource losses.

Depression Symptoms Worries about resource losses during COVID-19 mediated the relation between parent group and depression symptoms during the pandemic (Supplement 4). NHW parents of children with asthma (0.26; 95% CI: 0.08, 0.45), BIPOC parents of healthy children (0.21, 95% CI: 0.05, 0.38), and BIPOC parents of children with asthma (0.21, 95% CI: 0.04, 0.40) experienced greater depression symptoms relative to NHW parents of healthy children through greater worries about COVID-19 resource losses.

Discussion

The current study extends prior research that demonstrated COVID-19 has disproportionately impacted BIPOC parents and parents of children with asthma [29] by identifying specific SDOH (discrimination, income loss during COVID-19) and worries about pandemic-related resource losses as mechanisms contributing to worse parental mental health during COVID-19, particularly among BIPOC parents and parents of children with asthma. These findings highlight the need to address discrimination, income loss, and pandemic-related worries about resource losses to enhance parental psychological functioning during and after the pandemic.

The USA is currently in a syndemic[2]: the COVID-19 pandemic is intersecting with, and exacerbating, factors that affect racial inequalities and health disparities, such as individual and systemic racism and discrimination, which creates greater risk for underserved groups [56]. The present study reified this notion by identifying that discrimination (among BIPOC parents of children with and without asthma) and perceived pandemic-related income losses (among BIPOC parents of children with asthma) served as mechanisms contributing to poorer mental health functioning (i.e., greater anxiety and depression symptoms) among BIPOC parents during the pandemic relative to NWH parents. Discrimination has demonstrated associations with a multitude of deleterious mental and physical health outcomes, with more robust negative associations between discrimination and health outcomes found among ethnic/racial minoritized populations [57, 58]. Recent COVID-19 data have also demonstrated that discrimination is a significant, increasing source of stress during the pandemic for Black, Asian, Latinx, and American Indian adults [59–64]. Taken together, these findings highlight how the pandemic is fueling drivers of health inequity that will impact the current and future health of many BIPOC families.

Current findings also demonstrated how BIPOC parents of a child with asthma (a medical condition patterned with racial disparities [18, 19, 65]) have poorer outcomes: BIPOC parents of children with asthma experienced greater anxiety and depression symptoms through greater COVID-19 income losses compared to NHW parents of healthy children. The relative indirect effects for income loss were nonsignificant for both NHW parents of children with asthma and BIPOC parents of healthy children when compared to NHW parents of healthy children. Income losses and its role in predicting greater anxiety and depression symptoms for BIPOC parents of children with asthma illuminate the current syndemic and the intersections of holding multiple minoritized identities [16, 31, 55, 56]: Existing health disparities (in COVID-19 and asthma) and systemic racism during COVID-19 (disproportionate income loss) are interacting to exacerbate mental health disparities. The past and current suffering of BIPOC parents necessitates multi-level COVID-19 responses that addresses health inequities and the drivers of inequities, including discrimination and systemic racism; as Richard Norton has beautifully stated, it requires a "national revival."[56]

[2] A syndemic is defined as multiple crises occurring simultaneously across all nations. Furthermore, this term has been used to describe the intersection of the COVID-19 pandemic with the experiences of various ethnic/racial minoritized groups and other underserved populations in the U.S. [55].

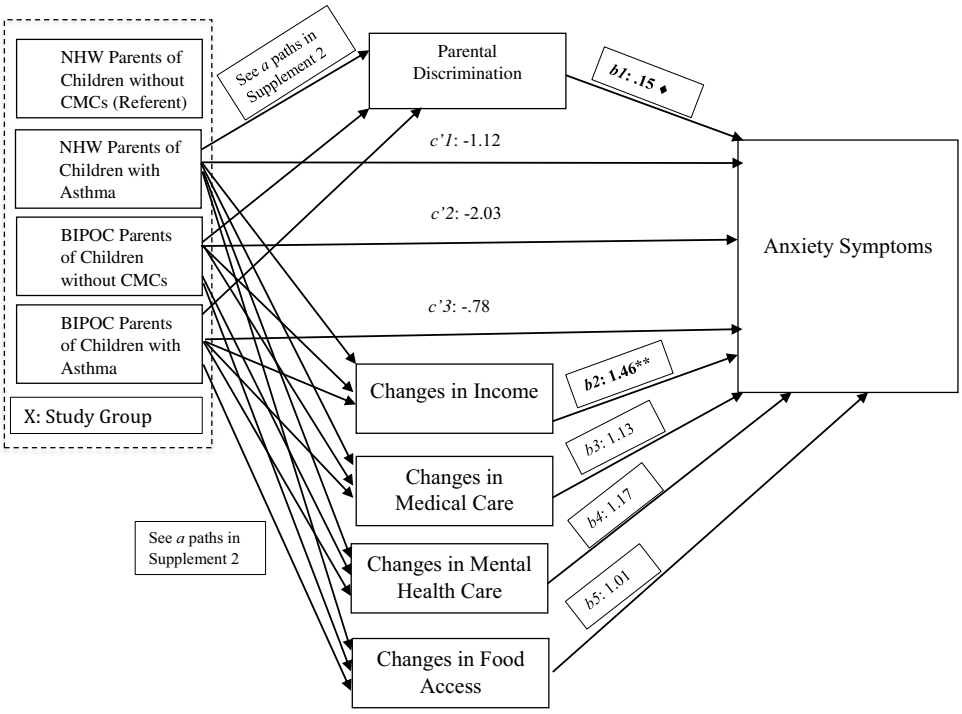

Fig. 1 Indirect Effects of Parent Group on Parental Anxiety Symptoms through Multiple Mediators. *Note*: Numerical values are the regression coefficients. Units for coefficients: *a* paths represent the relation between X and M; *b* paths represent the relation between M and Y; *c* paths represent the direct relation between X and Y; and *c'* paths represent the indirect relation between X and Y controlling for M. All path coefficients are in Supplement 2; significant paths are **bolded**. $*p < .05$, $**p < .01$, $***p < .001$, $\blacklozenge p = .05$. Analyses controlled for parent age, asthma, education, gender, and COVID-19 history, and child COVID-19 testing history. Mediation analyses were conducting using heteroskedasticity-consistent standard error estimators, 5,000 bootstrapped resamples, and 95% confidence intervals

Importantly, current results identified that parents' worries about resource losses during the pandemic also contributed to increased parental anxiety and depression symptoms, particularly among BIPOC parents and parents of children with asthma. Specifically, NHW parents of children with asthma and BIPOC parents of children with asthma and of healthy children experienced greater anxiety and depression symptoms through greater worries about COVID-19 resource losses relative to NHW parents of healthy children. The uncertainty about how COVID-19 may affect youth with asthma is understandably frightening, and parental worries about resource losses are likely linked to concerns about how these losses may impact family health (e.g., access to asthma or COVID-19 treatment). Consistent with the NIMHD Health Disparities Research Framework that was used to identify key factors impacting COVID-19 health disparities [30], current findings confirm multi-level factors (individual-level worries about resource losses and family-level pandemic-related resource losses, both of which are likely impacted by upstream interlocking systems of oppression) are contributing to mental health disparities, particularly for BIPOC families of children with and without asthma. These results suggest that BIPOC families are particularly in need of additional supports during the pandemic to buffer their exposure to drivers of health inequity. Individual-level mental health interventions may help parents to better cope with COVID-19 worries and uncertainty. Policy- and public health-level interventions could further enhance supports for families with resource losses and ensure equitable access to quality health care for all families (for an example of a framework for addressing disparities, see [29]).

This study advances our understanding of parent mental health outcomes during COVID-19, but it also has notable limitations. The cross-sectional study design precludes detecting causality; for example, we were unable to examine how pre-pandemic anxiety and depression symptoms have affected current mental health symptoms during the pandemic. Changes in medical care, mental health care, and food access during COVID-19 were not significant mediators. Perhaps, COVID-19 income losses have a larger effect than the other SDOH. Our overall sample subsample sizes, along with the use of single items to assess SDOH, may have limited our ability to detect other indirect effects. While crowdsourcing methods have demonstrated comparable results to in-lab methods and allowed for nationwide recruitment of individuals from diverse backgrounds [42], there are also sample limitations. Prolific predominantly uses convenience sampling; however, given that we

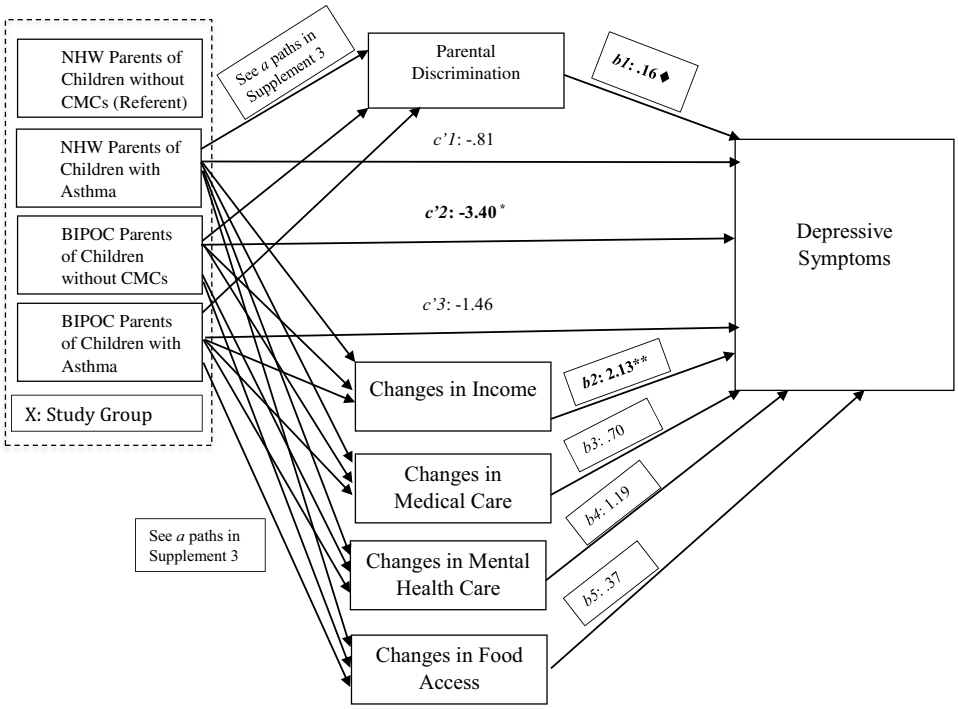

Fig. 2 Indirect Effects of Parent Group on Parental Depressive Symptoms through Multiple Mediators

Note: Numerical values are the regression coefficients. Units for coefficients: *a* paths represent the relation between X and M; *b* paths represent the relation between M and Y; *c* paths represent the direct relation between X and Y; and *c'* paths represent the indirect relation between X and Y controlling for M. All path coefficients are in Supplement 3; significant paths are **bolded**. **p*< .05, ***p*< .01, ****p*< .001, ♦*p*=.055. Analyses controlled for parent age, asthma, education, gender, and COVID-19 history, and child COVID-19 testing history. Mediation analyses were conducting using heteroskedasticity-consistent standard error estimators, 5,000 bootstrapped resamples, and 95% confidence intervals.

selectively recruited four parent groups, response bias may be less of a concern among our specific sample. However, our sample did have higher levels of education and income compared to the general population [66], which limits the generalizability of findings (e.g., families with lower education/income). Importantly, the inequities detected in the current sample may be even more pronounced among a more representative sample of families with lower education/income and those from rural and underserved areas. Given these limitations, findings must be interpreted with caution. The study focused on better understanding differences between BIPOC and NHW families of children with and without asthma, and we acknowledge that collapsing four parent groups in this way, and the use of the BIPOC acronym, limited our ability to examine sociocultural nuances in lived experiences and COVID-19 inequities among each specific ethnic/racial minoritized group in the USA, including Black, American Indian/Alaskan Native, Latinx, and Asian peoples, as well as peoples from multiple ethnic/racial minoritized backgrounds. Furthermore, each ethnic/racial group is not a monolith, is not confined to or defined by oppression, and has strengths and rich cultural traditions [67]. While the discrimination measure [49] has demonstrated overall invariance in capturing discrimination across several ethnic/racial groups, some prior research has indicated differential findings for the latent construct of discrimination and for one particular item (i.e., Item 7, "People act as if they're better than you are") [51]; however, these differences have neither been consistent across studies assessing discrimination with ethnic/racial diverse samples [68] nor in studies with samples of AI/AN individuals [69].

Future research should longitudinally study the differential impacts of COVID-19 on families from varying ethnic and racial backgrounds and with various health conditions using large, nationally representative samples to better elucidate nuances of COVID-19 impacts. In sum, our findings identified that discrimination, COVID-19 income loss, and pandemic-related worries about resource losses each served as mechanisms contributing to worse mental health among BIPOC parents and parents of children with asthma during the pandemic.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s40615-022-01311-9.

Author contributions All authors contributed to the study conception and design. Material preparation and data collection were performed by all authors. Analysis was completed by Ashley Clawson and Ashley Cole. The first draft of the manuscript was written by Ashley Clawson and Ashley Cole; all authors contributed to drafting versions of the manuscript. All authors read and approved the final manuscript.

Funding Manuscript preparation was supported through R01CA221819-01A1S1 and a grant through the Health Promotion Research Center.

Data Availability Not applicable.

Declarations

Ethics approval This study was approved by the Oklahoma State University IRB (IRB-20–294).

Consent to Participate All participants completed informed consent prior to study participation.

Financial Interests The authors have no relevant financial or non-financial interests to disclose.

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